CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

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Approved by	Recognized Research Centers	Programs Accredited by	Grade A++ in	All India Ranking 151-200 Band	ISO Certifications
AICTE		NBA	NAAC	nirf NATIONAL INSTITUTIONAL RANKING FRAMEWORK	Quality Audit 9001 : 2015 Green Audit 14001 : 2015 Energy Audit 50001 : 2018

7.2 - Best Practices
7.2.1 - Provide the weblink on the Institutional website regarding the Best practices as per the prescribed format of NAAC

Best practice-I

1. Title of the Practice:

Innovative research on contemporary societal needs

2. Objectives of the Practice:

CBIT has taken up a multidisciplinary project "Indo-American Artificial Heart Program" (IAAHP) which is a philanthropic research program, that brings together the medical and engineering fraternities towards building a low-cost left ventricular assist device; a centrifugal blood pump for cardiovascular support.

   a. To promote applied and contemporary Research Culture in the institute
   b. To create a habit of exploring societal needs and identifying the thrust areas.
   c. To formulate problems that are amenable for Engineering judgment and probable solutions.
   d. To encourage faculty to apply for external /In-house funding based on the outcome of the pilot projects.

3. The context

Research essentially requires creativity, which is mandatory for any entrepreneurial effort also. The college despite having its motto as "Swayam Tejaswin Bhava" was focussing on "teaching-learning mode". Realizing the importance of research, an exclusive **R & E cell** was established with all the required infrastructure. Added to this, the academic autonomy of the institute awarded in 2013 has enabled it to take necessary steps that lead to the best practice of promoting research for current societal needs. It is in this context CBIT has taken up a multidisciplinary project Indo-American Artificial Heart Program (IAAHP) which is a collaborative research program, bringing together medical and engineering fraternities towards building a low-cost left ventricular assist device; a

centrifugal blood pump for cardiovascular support. Various collaborative organizations of this project are CBIT, SHARE INDIA, SNIST, KITSW, AIG Hospitals, Laxven Systems and esteemed foreign organizations and universities including University of Pittsburgh, Cornell University and Vadovations.

4. The Practice

It is a regular practice in the R & E Hub of the Institute to prepare analytical and experimental models of the contemporary problems in the society to search for amenable and affordable solutions. For the referred Artificial Heart project, the following modeling methods were practiced:

Various versions of the pump were designed using Solid Works and computational analysis was done using ANSYS Workbench. The pump is designed to deliver a flow rate of 5.0 LPM and a pressure head of 120 mmHg for LVAD setting and 500 mmHg for ECMO setting. SLA 3D printer was used for rapid prototyping.

The CAD models of the pump parts were sent to a manufacturing facility of consortium in collaboration Hyderabad. The material used for the pump components is Polycarbonate (PC). A die was machined as per the designs for the pump casing and impeller. The injection molded parts were inspected for dimensional and design accuracy and surface roughness. Design changes and modifications were noted and executed.

Polycarbonate injection-molded pump casing and impeller were joined using various types of adhesives, manually using a syringe and later with a 3D-Printer robotic arm. The Hyrel 3D printer uses interchangeable heads attached to a stepper motor with a syringe, to print the desired object. The CAD model of the glue path was generated in SolidWorks and converted to 3D Printer compatible STL file.

Pump Fixtures: In order to place the pump bottom casing on top of the printer bed, and to join the top casing after adding the glue, top and bottom casing fixtures were modeled and 3D printed using ABS material. The fixtures ensured proper alignment of the injected glue with the glue path on the bottom casing and also precision while placing the top casing on the bottom one.

Dymax 1201(viscosity=8000cP), a biocompatible UV curable adhesive was selected to glue the pump casings together. The pump casing was further modified to a tongue and groove arrangement. UV curable glue was injected in the groove of the bottom casing and the top casing with the tongue was added on top. The pump casing was 3D printed in an SLA printer for trials. The glue was successfully added and the top casing was attached to the robotic arm without any spill inside. The glue was UV-cured using Form Cure UV equipment.

5. Evidence of Success

- CBIT is carrying out an international collaborative research project Ärtificial Heart '' in collaboration with SHARE India, University of Pittsburgh, Cornell University(USA), AIG Hospital(Hyderabad), Palamur Biosciences. The aim of the project is to bring out the artificial heart with a cost of not more than Rs.5 lakhs per unit. **Design and development, Prototyping, laboratory testing and In-**

vivo testing on sheep are completed for the pump developed and Human trials are pending.

- **Two design patents were published from Artificial Heart Project; 1. Blood pump impeller and 2. Magneto blood pump, and one process patent is filed**
- The projects sanctioned in the last 5 years by various research organizations are **41** worth about **Rs.88 lakhs**. and applied projects are 176.
- As part of an **International collaboration** between CBIT and Najran University Kingdom of Saudi Arabia (KSA), had a series of meetings and initiated a **consultancy project** titled "**Enhancement of the performance of different renewable energy sources using modern techniques**" for the duration of 2 years.
- CBIT, Hyderabad and University College of Engineering, JNT University Kakinada, signed an MoU on 31st March 2017 to create expertise and cater to growing Marine Navigation and Communication research needs in India and abroad.

6. Problems Encountered and Resources Required

Forty two different designs with cavitation models were developed for left ventricular assisting devices. The clinical trials were carried out at palamuru Bioscience with the help of AIG hospitals and the Department of Science and Technology of DST.

- As such there are no protocols developed so far in India for the LVAD development. Hence it is necessary to develop the product along with the protocols by involving the scientists of DST.
- Once LVAD was connected to animal (Sheep/Goat) there was a huge hemolysis which was eliminated in the 3rd cycle by changing the design of LVAD.
- Funding is another constraint, where CBIT contributed around Rs. 50 Lakhs and A 2 Cr worth instrumentation is by consortium institutions, however still we required huge funding to complete the project. To overcome this, we are expecting each institution to depute manpower with the institute's own cost and to share recurring expenditure.

Best Practice-II
1. Title of the practice:

Open Source projects and Hackathons through COSC Club

2. Objectives of the Practice:
CBIT Open Source Community (COSC) club was established with an objective of providing a platform for creative activities. The objectives of the COSC club:

- To promote free and open knowledge-base in society.
- To encourage open-source software usage by creating awareness among the students and community about open sources philosophy.
- To contribute and collaborate for the development of FOSS (Free and Open Source Software) and Technologies that help people and the community at large.
- To conduct technical events, seminars, boot camps, workshops and webinars.
- To organize internship programs during summer and winter vacations.

3. The Context:
COSC is an open source focused Tech Community based club of Chaitanya Bharathi Institute of Technology, Hyderabad. It was formed in 2017 by a group of open-source enthusiasts who use and promote open-source software. In the present context, open-source technologies and knowledge systems are playing a major role in Engineering and Technology, with millions of developers, students, academicians, and professionals contributing to them. In this context, CBIT started COSC was started to encourage the students to participate in its activities where they can become FOSS users/debuggers/contributors/ resource persons/ Project maintainers, The members of this community conduct technical sessions, workshops, seminars, boot camps, and Hackathons on different open-source software and technologies and teach the students about the open-source software and encourage them to use it. One of the major events is Hacktoberfest which is conducted every year in the month of October, by inviting the people from industry, organizations, and communities as resource participants/ persons/ judges for the events.

4. The Practice:
CBIT Open-Source Community (COSC) club is one of the most vibrant and successful clubs through which we secured prizes in various events including the Smart India Hackathon (SIH), an event of AICTE. Since its inception, COSC-CBIT could bag first prizes in all editions. The students of this community conduct technical sessions on different open-source software and technologies and teach the students about the open-source software and encourage them to use it.

The basic principle of COSC: The volunteers of COSC pledge to work as a contributor and/or maintainers in the interest of fostering an open and welcoming environment, participate in projects and community with a harass-free experience for everyone

regardless of age, color, disability, gender, gender identity and expression, level of experience, education, socio-economic status, region, personal appearance, race, religion, or sexual identity, and orientation.

The Project maintainers are responsible for clarifying the standards of acceptable behavior and are expected to take appropriate and fair corrective action in response to any instances of unacceptable behavior. Project maintainers have the right and responsibility to remove, edit, or reject comments, commits, code, wiki edits, issues, and other contributions that are not aligned to this Code of Conduct, or to ban temporarily or permanently any contributor for other behaviors that they deem inappropriate, threatening, offensive or harmful.

Scope: This Code of Conduct applies within all project spaces, and it also applies when an individual is representing the project or its community in public spaces. Examples of representing a project or community include using an official project e-mail address, posting via an official social media account, or acting as an appointed representative at an online or offline event. Representation of a project may be further defined and clarified by project maintainers.

Enforcement: Instances of abusive, harassing, or otherwise unacceptable behavior may be reported by contacting the project team. All complaints will be reviewed and investigated and will result in a response that is deemed necessary and appropriate to the circumstances. The project team is obligated to maintain confidentiality with regard to the reporter of an incident. Further details of specific enforcement policies may be posted separately. Project maintainers who do not follow or enforce the Code of Conduct in good faith may face temporary or permanent repercussions as determined by other members of the project's leadership.

5. Evidence of Success:

Since its inception, COSC conducted several events including the development of its own website and the members participated and won the prizes in several Hackathons. Every year events like **WebVR,** *Python 101, Flask and ML, Django Campv2.0, Hands-on workshop on Deep Learning, Introduction to Git and Front-End Technologies, CBIT Hacktoberfest Hackathon* are conducted to impart training to the students **on latest technology and skills** by the industry experts which enable them **to do better projects** and to **win the prizes** in the competitions.

Some of the achievements are:

Hackathon Winners details for 2022-23

- 5 students of CSE - IoT, CS and BCT dept participated and won prize money of Rs.50,000 - Smart India Hackathon - Grand Finale organized by Government of India, All India Council for Technical Education on 25-08-2024 and 26-08-2024
- 5 students of CSE(IoT and CSBT) dept participated and won prize money of Rs. 16,000 - Tech Savishkaar organized by Vasavi College of Engineering from 4-03-2023 to 25-03-2023

- 2 students of IoT, CS and BCT dept participated in and won prize money of Rs. 2000 -Credenz'23 organized by CTR's Pune Institute of Computer Technology, Dhankawadi, Pune on 14-05-2023
- 4 students of CSE dept participated in and won prize money of Rs. 5,00,000- Hexathon 2023 Code for Planet organized by Hexagon on 29-04-2023 and 30-04-2023
- 4 students of CSE dept participated and won prize money of Rs. 1000 -Tech Savishkaar organized by Vasavi College of Engineering from 19-02-2023 to 25-03-2023
- 4 students of CSE dept participated in and won prize money of Rs. 15,000 - CBIT Sudhee 2k23 Hackathon organized by CBIT on 29-01-2023 and 30-01-2023
- 5 students of CSE 3 dept participated in and won prize money of Rs. 50,000 - Invesco Hack2Hire hackathon organized by Invesco on 10-01-2023
- Madireddy Sai Siddharth Reddy of CSM dept participated and won prize money of Rs.50,000 - Micron Hack 2022 organized by Micron from 01-08-2022 to 30-09-2022
- Sakinala Sathvik of IT1 dept and won prize money of Rs. 50,000 -Invesco Hack2Hire hackathon organized by Invesco on 04-04-2023

6. Problems Encountered and Resources Required:
- Funding is required to organize competitions and to give away the prizes. To some extent, the institute is sponsoring but requires more funds to encourage more events and to give more prizes.
- The second is the space for the conduct of events, discussion, meetings etc. It requires more seminar halls and computer labs. Sometimes it is difficult to adjust the almanac, however we are trying to develop separate space for these activities without disturbing the class work.
- Academic Calendar is tightly scheduled either with the regular classwork or examinations. Hence, to include the activities of COSC as part of academics like internships, activity points, etc. is under consideration.
- Finding faculty advisors during Smart India Hackathon competitions that were conducted outside the state has become a tough task. Faculty advisors with real-time project exposure are to be nominated as advisors for SIH and other competitions.

Best Practice-III

Title of the Practice:
Best practices followed by the department of ECE

Objectives of the Practice:
The main objective is to enhance the performance of the department in terms of imparting education to the student community and also for good Research.

The Practice:

Chaitanya Bharathi Institute of Technology
Department of ECE

"Good practices" being followed in our department

1. Department has different committees like CCC (Common Course Committee), MCC (Multiple Course Committee) and OMC (Overall Monitoring Committee) to improve the effectiveness of the teaching-learning process.
2. A three day Semester Readiness Program (SRP), a pre-semester curriculum summit where faculty collaboratively cogitate, plan, design, develops a learner centric teaching environment.
3. Three course audits in every semester to inspect the on-going academic activity
4. To enhance the Quality of the Program and to ensure Continuous Improvement PAQIC, DAB, BoS, DRC and CEGs are available.
5. Balanced composition of representatives from Industry, R&D Organizations, Premier academic institutions and alumni are maintained in all departmental committees (PAQIC, DAB, BoS and DRC).
6. Effective academic practices with CBCS and OBE implementation
7. Dedicated OBE website is designed for CO-PO attainment procedures. (This was appreciated by recent NBA visit experts).
8. Curriculum is being revised every 2 years to meet current trends.
9. In-house financial support for carrying out innovative students' projects.
10. Students are doing projects in industry supported labs (NCRC).
11. Students are encouraged to do Mini projects, open-ended and structured enquiry based experiments in each lab.
12. Experienced and dedicated faculty in all important domains of ECE
13. Well trained and skilled technical staff to cope up with the latest experiments
14. Maintaining the good Retention Ratio of the faculty
15. Students are encouraged to do SWAYAM NPTEL/MOOCs to enrich their knowledge base.
16. Every year a good number of project proposals are submitted to funding agencies.
17. Students are trained on Entrepreneur skills through T-Tribe of T-Hub.
18. Dedicated hours in the time table for counseling and mentoring (Discovery wheel concept) and for FIT India.

19. Organizing Guest Lectures by alumni and Industry experts.
20. Active professional clubs such as IEEE SB, IETE Student Forum, IEEE SPS SBC, IEEE CSS, MoI and Robotics.
21. Awarding best teacher and student awards.
22. Yearly a technical fest (SYNAPSE) and a cultural and sports fest (SHRUTHI) are organized for inculcating the competitive spirit among the students.
23. Organising R & D day to inculcate the research culture.
24. Instituted a research medal/award (Dr.V.M Rao Medal) to recognise and honor the best student performer in research.
25. Encourages the students with financial support to take part in technical events, seminars & conferences.
26. Campus Recruitment Training for pre-final year students to improve placements further.
27. Mandatory Internships and Industrial visits for better industrial exposure.
28. Mandatory activity points for all round development of learners.
29. Dedicated project lab for students to carry out their projects.
30. Encouraging students to participate actively in Co-Curricular and Extra-Curricular activities through CBIT clubs.
31. Stakeholder surveys are considered for improvement.
32. Good number of MoUs with reputed organizations.
33. LabVIEW Academy School to train the students in LabVIEW.
34. Systematic procedure for allotment and monitoring student projects. Plagiarism checks to improve the quality.
35. Yearly releasing news bulletin.
36. ICT tools are used for interactive teaching.
37. Well-structured Course material is maintained and is made available to students through LMS.
38. Assignments are designed to address higher BT level.
39. Remedial classes are conducted for slow learners and for fast learners GATE classes are being conducted.